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| 09/262,530      | 03/04/1999  | ALFONSO B. PICCIRILLI | 4-75                | 9521             |

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EXAMINER

BELLO, AGUSTIN

ART UNIT PAPER NUMBER

2633

DATE MAILED: 03/20/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/262,530

Applicant(s)

PICCIRILLI, ALFONSO B.

Examiner

Agustin Bello

Art Unit

2633

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3. 6) ☐ Other: \_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 11, 13, 14, and 25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 25, it is not clear how a demultiplexer can generate two more distinct driver signals, nor is it clear how the demultiplexer is able to combine the respective optical signals and couple them into a transmission medium.

3. Claims 11, 13, and 14 recite the limitation "the optical radiation" and "the coding wavelengths" in line 4 of claim 11, "said non-linear mixing" in line 9 of claim 11, "output radiation" in line 1 of claim 13, "the pattern of wavelength variation" in line of claim 14. There is insufficient antecedent basis for these limitations in these claims.

### *Claim Rejections - 35 USC § 102*

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2, 7, 9, 15, 20, 28, and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Dugan (U.S. Patent No. 5,710,650).

Regarding Claim 1, Dugan teaches a method for transmitting data content provided in a data signal, comprising, assigning distinct portions of the data signal to two or more respective channels for each channel (abstract), using corresponding assigned

portions of the data signal to modulate an optical carrier at a respective wavelength associated with that channel (reference numeral 40,42 in Figure 2), and transmitting an optical output signal that comprises modulated carrier energy at each of the respective wavelengths, such that data content is carried, in the transmitted optical output signal, by energy at two or more of the respective wavelengths (see abstract, column 3 lines 1-6).

Regarding Claim 2, Dugan teaches the method of claim 1, wherein the modulated carrier energy is transmitted in sequential segments, each such segment having a respective wavelength (inherent in a wavelength multiplexed signal and column 3 lines 1-6).

Regarding Claim 7, Dugan teaches the method of claim 1, wherein the transmitting step comprises launching the optical output signal into an optical fiber (reference numeral 48 in Figure 1).

Regarding Claim 9, Dugan teaches the method of claim 1, wherein, the data signal is an electrical signal, (reference numeral 32 in Figure 1), the assigning step comprises deriving two or more electrical driver signals from the data signal (reference numeral 16, 18, 20, 22, 40, 42 in Figure 1), each driver signal corresponding to a respective channel (reference numeral 42 in Figure 1), and the modulating step comprises using each driver signal to cause a respective optical emission device to emit an optical signal at a respective wavelength (column 5 lines 25-34).

Regarding Claim 15 and 28, Dugan teaches a method of optical communication, comprising receiving an optical signal that contains energy in two or more distinct wavelength channels, assembling portions of the received optical signal, from distinct

wavelength channels, into a single, sequential data stream and recovering data content from the assembled data stream (column 3 lines 9-16).

Regarding Claims 20 and 31, Dugan teaches the method of claim 15, wherein the method further comprises optically demultiplexing the received signal, thereby to provide two or more single-channel optical signals, the method further comprises detecting each of the single-channel signals, thereby to provide two or more single-channel electronic signals; and the assembling step comprises electronically multiplexing the single-channel electronic signals (see Figure 2 and column 3 lines 9-16).

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 3, 8, 12-14, 16, 22, 25, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dugan in view of Hait (U.S. Patent No. 6,256,124).

Regarding Claims 3 and 22, Dugan teaches the limitations of claim 1, but differs from the claimed invention in that Dugan fails to specifically teach that the assigning step comprises assigning, to each channel, those portions of the data signal that coincide with a recurring time window allocated to that channel. However, Dugan suggest that timing is used when assigning data to each wavelength channel (reference numeral 24, 38 in Figure 1, column 5 lines 15-18, column 6 lines 22-25, column 7 lines 3-6). Furthermore, Hait, in the same field of endeavor, teaches an assigning step in a parallel-to-series data converter which entails assigning data to a wavelength carrier prior to multiplexing

according to timing signal (reference numeral 35,44,46,47 in Figure 2, column 2 lines 18-25, column 4 lines 33-50, column 5 lines 1-11, 26-31). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have assigned data to an optical wavelength according to a time window allocated to that channel, as suggested by Dugan and taught by Hait, in order to form sequential data frames having a smaller bandwidth than the original data signal, thereby lowering the bandwidth requirement of the system.

Regarding Claim 8, Dugan teaches the method of claim 1, but differs from the claimed invention in that Dugan fails to specifically teach that the transmitting step comprises launching the optical output signal into free space. However, Hait teaches that in a parallel-to-series data conversion comprising the wavelength multiplexing of a plurality of data signals, it is possible to launch the optical output signal into free space (column 6 lines 3-4). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have launched the optical output signal into free space as taught by Hait in order to facilitate remote data transmission without the use of fibers.

Regarding Claims 12-14 and 27, Dugan teaches the limitations of claim 1, and further teaches that the data signal is an electrical signal (reference numeral 32 in Figure 1) and that the assigning and modulating steps comprise using the data signal to modulate the output radiation such that each portion of the data signal is modulated onto an assigned wavelength of output radiation (as discussed in claims 1 and 2), but differs from the claimed invention in that Dugan fails to specifically teach operating a tunable light source to produce output radiation that varies stepwise in wavelength according to a pattern. However, Hait teaches using a tunable light source in order to achieve

wavelength multiplexing of a TDM signal according to a pattern (column 4 lines 42-67, column 5 lines 1-11, column 11 lines 28-43). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have used a tunable light source as the source of radiation, as taught by Hait, in the device of Dugan, in order to reduce the number of light sources required to achieve wavelength multiplexing of TDM signals.

Regarding Claim 16, the combination of Dugan and Hait teach the limitations of this claim in view of the rejection of claim 3, with the process reversed at the receiver.

Regarding Claim 25, Dugan teaches that the data signal source is an electronic signal source (reference numeral 32 in Figure 1), the apportioning system comprises an electronic demultiplexer operative in response to the data signal to generate two or more distinct driver signals (inherent in the separation of a high bit rate signal into a plurality of low bit rate signals and reference numeral 16, 18, 20, 22, 40 in Figure 1) the apportioning system further comprises a respective optically emissive device (reference numeral 44 in Figure 1) operative in response to each driver signal to generate a corresponding optical signal in a distinct wavelength channel, and the output element comprises an optical multiplexer (reference numeral 46 in Figure 1) operative to combine the respective optical signals and couple them into the transmission medium.

8. Claims 4-6, 17-19, 23-24, 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dugan in view of Hait and Chang (U.S. Patent No. 6,160,651).

Regarding Claims 4, 5, 23, and 24, the combination of Dugan and Hait teach or suggest the limitations of claims 3, but differs from the claimed invention in that they fail to specifically teach permuting the recurring time windows allocated to the channels,

such that data content carried in the transmitted optical output signal occurs in a different sequence from the data content provided in the data signal. However, Hait further teaches the use of delays that can be used to vary the introduction of the multiplexed signal to output fiber as well as the transmission protocol of the output signal.

Furthermore, Chang teaches a method for securing data transmitted over a network via a plurality of wavelengths wherein it is possible to vary the data format and protocol (column 5 lines 62-67, column 6 lines 1-21), thereby preventing eavesdropping.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have permuted the recurring time windows allocated to the channels via the manipulation of the delay lines taught by Hait so that data signals to be wavelength multiplexed are introduced into the fiber in sequence different from the input data sequence thereby observing the suggestion by Chang to vary the data format and protocol in order to secure the data transmitted over the network from eavesdropping.

Regarding Claim 6, the combination of references teach the method of claim 5 further comprising transmitting, as part of the optical output signal, information that describes how the time windows were permuted (column 5 lines 57-61 of Dugan, column 5 lines 27-47 of Chang, and the clock signal transmitted in Dugan).

Regarding Claims 17-19, 29, 30 the combination of Dugan, Hait, and Chang teach the limitations of this claim in view of the rejection of claims 4 and 5, the process at the receiver being reversed from the process at the transmitter.

9. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dugan in view of Norte in the article "All-Optical TDM-to-WDM Data Format Conversion in a Dynamically Reconfigurable WDM Network."



Regarding Claims 10, Dugan teaches the method of claim 1, but differs from the claimed invention in that Dugan fails to specifically teach that the data signal is an optical signal having a wavelength  $\lambda_D$ , and the modulating step comprises providing optical radiation at two or more wavelengths to be referred to as coding wavelengths, and mixing a respective portion of the data signal with optical radiation at each of the coding wavelengths in a nonlinear optical device, thereby to generate modulated radiation having a wavelength different from the wavelength  $\lambda_D$  and the coding wavelengths. One skilled in the art would clearly have recognized that the method of converting a TDM signal to a WDM according to the teachings of Dugan would have been time consuming and costly. However, Norte teaches a system that operates according to the limitations of the claim (see Figure 1-4) that provides a time and cost advantage over the method of Dugan (column 1 lines 30-37 of Norte). Since both Dugan and Norte are concerned with TDM-to-WDM conversion of a data signal via different wavelengths, one skilled in the art could have successfully implemented the method of modulation taught by Norte in the modulation step taught by Dugan. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have modulated the optical signals according to the teachings of Norte in the modulation step taught by Dugan.

10. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dugan in view of Hait and Chang (U.S. Patent No. 6,160,651) and Norte in the article "All-Optical TDM-to-WDM Data Format Conversion in a Dynamically Reconfigurable WDM Network."

Regarding Claim 11, the combination of Dugan, Hait and Chang teach the limitations of claim 6, but differ from the claimed invention in that they fails to

specifically teach the assigning step comprises assigning, to each each channel, those portions of the data signal that coincide with a recurring time window allocated to that channel; the optical radiation at each of the coding wavelengths is provided in the form of a train of pulses; each train of pulses corresponds to a recurring time window allocated to one of the channels; and the respective wavelength associated with each of the channels is a wavelength of modulated radiation generated by said non-linear mixing. However, Norte, in the same field of endeavor, teaches a system that operates according to the limitations of the claim (see Figure 1-4) that provides a time and cost advantage over the method of Dugan (column 1 lines 30-37 of Norte). Since the combination of Dugan, Hait and Chang and Norte are concerned with TDM-to-WDM conversion of a data signal via different wavelengths, one skilled in the art could have successfully implemented the method of modulation taught by Norte in the modulation step taught by Dugan. One skilled in the art would clearly have recognized the time and cost advantage of the method taught by Norte. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have modulated the optical signals according to the teachings of Norte in the modulation step taught by the combination of Dugan, Hait and Chang.

11. Claims 21 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dugan in view of Norte in the article, "Demonstration of an All-Optical Data Format Transparent WDM-to-TDM Network Node with Extinction Ratio Enhancement for Reconfigurable WDM Networks."

Regarding Claims 21 and 32, Dugan teaches the limitation of claim 15 and 28, and further teaches optically demultiplexing the received signal thereby to providing two

or more single-channel optical signals (see Figure 2), but differs from the claimed invention in that Dugan fails to specifically teach the method further comprising, shifting each of the single-channel signals into a common wavelength channel by non-linear optical mixing, and the assembling step is carried out by optical multiplexing. One skilled in the art would clearly have recognized that the method of converting a WDM signal to a TDM according to the teachings of Dugan would have been incur penalties during the conversion of the data. However, Norte teaches a system that operates according to the limitations of the claim (see Figure 1-4) that provides a penalty free method of conversion which is clearly advantageous over the method of Dugan (abstract of Norte). Since both Dugan and Norte are concerned with WDM-to-TDM conversion of a data signal via different wavelengths, one skilled in the art could have successfully implemented the method of shifting taught by Norte to assemble the received data in the system taught by Dugan. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have, shifted each of the single-channel signals into a common wavelength channel by non-linear optical mixing the optical signals to assemble the received data according to the teachings of Norte in the system taught by Dugan.

12. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dugan in view of Hait and Norte in the article "All-Optical TDM-to-WDM Data Format Conversion in a Dynamically Reconfigurable WDM Network."

The combination of Dugan and Hait teach the limitations of claim 22, and as discussed regarding claim 10, Norte teaches a system that operates according to the limitations of the claim (see Figure 1-4). One skilled in the art would clearly have

recognized that the method of converting a TDM signal to a WDM according to the teachings of Dugan would have been time consuming and costly. However, Norte teaches a system that operates according to the limitations of the claim (see Figure 1-4) that provides a time and cost advantage over the method of Dugan (column 1 lines 30-37 of Norte). Since both Dugan, Hait, and Norte are concerned with TDM-to-WDM conversion of a data signal via different wavelengths, one skilled in the art could have successfully implemented the method of apportioning taught by Norte in the apportioning system taught by Dugan and Hait. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have apportioned the optical signals according to the teachings of Norte in the apportioning step taught by Dugan.

#### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Agustin Bello whose telephone number is (703)308-1393. The examiner can normally be reached on M-F 8:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (703)305-4729. The fax phone numbers for the organization where this application or proceeding is assigned are (703)872-9314 for regular communications and (703)872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-3900.

  
JASON CHAN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600

AB  
December 15, 2001